Saskatchewan

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Agriculture Development Fund

FINAL REPORT

EVALUATION AND RELEASE OF NEWLY DEVELOPED POTATO VARIETIES FOR LOCAL AND EXPORT MARKETS

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Evaluation of Newly Developed Potato Clones for Production in Saskatchewan

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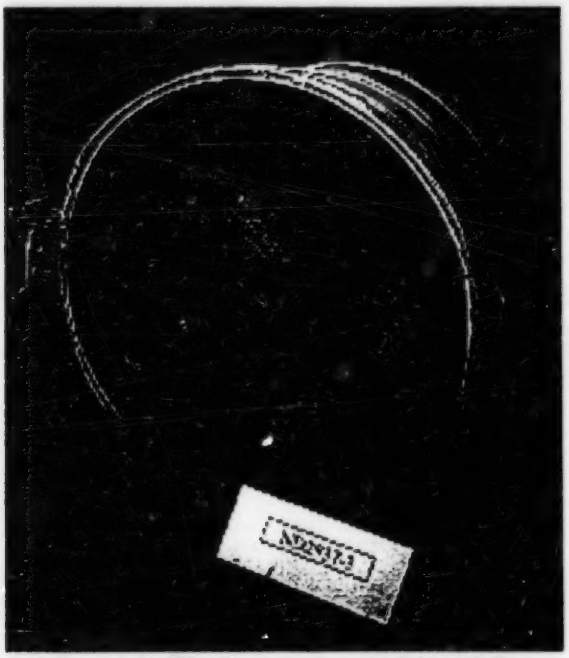


AC Peregrine Red - a new red-skinned line, exclusive to members of the Saskatchewan Seed Potato Growers Assoc.

Prepared by: Doug Waterer
Vegetable Crop Specialist
Dept. of Plant Sciences
University of Saskatchewan

Evaluation of Newly Developed Potato Clones for Production in Saskatchewan

Abstract

The continuing health and expansion of Saskatchewan's potato industry depends on the growers planting the best available cultivars. The Prairie Regional Potato Trials (PRPT) develop and test potato lines with characteristics required by the potato industry on the Canadian prairies. **This project covered Saskatchewan's participation in the PRPT from 1998-2000.** More that 300 breeding lines were evaluated during the 1998-2000 cropping seasons for vigor, earliness, yields, tuber appearance, disease and insect resistance, flavor and processing characteristics. Results of PRP trials determine which releases are licensed, named and made available to prairie potato growers. From 1995-2000, the PRPP released 58 lines with sufficient merit to warrant industry evaluation. Over 30% of the potatoes grown on the Canadian Prairies in 2000 were developed by the PRPP. The Saskatchewan Seed Potato Growers Association (SSPGA) has used the data generated by the PRP trials as a basis for obtaining exclusive licences for AC Peregrine Red and FV9649-6. Exclusive ownership of new and improved varieties will Saskatchewan's potato industry with an advantage in a competitive marketplace.

Executive Summary

The potato industry in Saskatchewan is, at present, too limited to justify a full-scale breeding program, yet the continuing health and expansion of the industry depends on the growers planting the best available cultivars. The Prairie Regional Potato Trials (PRPT) develop and test potato lines with characteristics required by the potato industry on the Canadian prairies. The Prairie Regional Potato Program (PRPP) of Agriculture Canada Lethbridge provides the personnel responsible for breeding, early generation selection and pathology while the participating provinces (BC, AB, SK and MB) conduct the regional test sites. Promising clones from the northern U.S. are evaluated as well as the clones developed by Canadian breeders. **This project covered Saskatchewan's participation in the PRPP and the PRPT from 1998-2000.** The PRPT are conducted at two sites in Saskatchewan (Saskatoon and Outlook). More that 300 breeding lines were evaluated during the 1998-2000 cropping seasons for vigor, earliness, yields, tuber appearance, disease and insect resistance, flavor and processing characteristics. Results of PRP trials conducted in Manitoba, Alberta, Saskatchewan and British Columbia are considered in determining which releases should be licensed, named and made available to prairie potato growers. From 1995-2000, the PRPP released 58 lines with sufficient merit to warrant industry evaluation. Over 30% of the potatoes grown on the Canadian Prairies in 2000 were developed by the PRPP. The Saskatchewan Seed Potato Growers Association (SSPGA) has used the data generated by the PRP trials as a basis for requesting exclusive licences for two lines derived from the Prairie Potato Breeding Program. These lines (AC Peregrine Red and FV9649-6) were evaluated in large scale field trials during the 2000 cropping season. **AC Peregrine Red has generated considerable industry interest, with significant acreages planned for the near future. The SSPGA 7 more lines derived from the PRPP under review for possible licencing.** Exclusive access to the new and improved varieties derived from the PPRP will Saskatchewan's potato industry with an important advantage in a competitive marketplace.

Project Background

Cultivar testing represents a highly efficient and cost effective means of maintaining and/or improving yields, quality and profitability or crop production. Industry needs may be matched with breeders achievements without the expense of maintaining a full breeding program. Growers are provided with the cultivars required to meet changing production practices, pest pressure and market demand.

Potato production in Saskatchewan is, at present, too limited to justify a full scale breeding program, yet the continuing health and expansion of the industry depends on the growers planting the best available cultivars. The Prairie Regional Potato Trials (PRPT) were initiated in 1979 at the request of the Prairie Potato Council to develop and test potato lines with characteristics required by the potato industry on the prairies. The Prairie Potato Regional Program (PPRP) administered by Agriculture Canada (Lethbridge) has provided the personnel responsible for breeding, early generation selection and pathology. The participating western provinces conduct the regional test sites. Promising clones from the northern central and western U.S. are evaluated in the PRPT as well as the clones developed by Canadian breeders. Saskatchewan has participated in the Prairie Regional Potato Trials since their inception, with funding provided through the Agriculture Development Fund and Saskatchewan Agriculture and Food.

This project supported Saskatchewan's participation in the Prairie Regional Trials during the 1998, 1999 and 2000 cropping seasons. These trials were conducted by the Department of Plant Sciences in conjunction with Canada Saskatchewan Irrigation Development Centre in Outlook.

The Prairie Regional Potato Trials are conducted in accordance with a standardized protocol which is followed at all testing sites. Clones or cultivars are included in the evaluation trials based on recommendations by the Cultivar Evaluation Committee of the Prairie Potato Council. Each year, performance of the various lines are evaluated by the Breeding and Selection Committee of the PRPT, with sub-standard types dropped from the trials, outstanding performers graduated to more extensive testing and the remainder examined again in the next year. There are five levels of testing, from the adaptation trial in which new entries are evaluated in small non-replicated plots, to the large replicated trials, in which the most promising lines are evaluated against standard cultivars. Entries are evaluated for vigor, earliness, yields, tuber appearance, disease and insect resistance, flavor and processing characteristics. Results of trials conducted in Manitoba, Alberta, Saskatchewan and Alberta are considered in determining which releases should be licensed, named and made available to prairie potato growers. While most of the trial sites are irrigated, there are also two dryland sites (Edmonton and Carmen).

The trials in Saskatchewan were conducted at the Horticulture Science Potato Plots in Saskatoon and at the Canada Saskatchewan Irrigation Diversification Centre in Outlook. The use of two sites allows for more thorough testing of the cultivars under differing conditions while also raising the profile of the trial with local grower groups. The Saskatoon site is a loam (pH 7.4) while the Outlook site is a moderately saline, sandy loam (pH 8.2). The Saskatoon site has severe problems with the common scab (*Streptomyces scabies*) and powdery scab (*Spongospora sp.*) which allows for effective screening of the new lines for resistance to these disease. Standard irrigated production practices are employed at both sites. A portion of the crop is harvested in late August to allow for evaluation of early yield potential. The remainder of the crop is harvested at the normal time in late September.

The breakdown of trials conducted at the two sites is as follows;

		Saskatoon Site	Outlook Site
1)	Adaptation Trial		
	- 30-40 most recent releases	yes	no
	- 8 plants/plot		
	- non-replicated		
2)	Advanced Adaptation Trial		
	- Level I - 40 lines	yes	no
	- 8 plants/plot		
	- 2 replicates		
	- Level II - 50 lines	yes	no
	- 12 plants/plot		
	- 4 replicates		
3)	Prairie Main Crop Trial		
	- 20 advanced lines	yes	yes
	- 20 plants/plot		
	- 4 replicates		
4)	Prairie Early Replicated Trial		
	- 10-15 advanced lines for areas with shorter growing seasons	yes	yes
	- 20 plants/plot		
	- 8 replicates		
5)	Prairie Region Registration Trials		
	- evaluate newly registered lines	no	yes
	- European and N. America breeding programs		

Data Collected: Emergence time, % stand, yield components at 85 and 110 days after planting, tuber appearance, plant and tuber disease incidence and reactions, boiling, baking, chipping, frying and storage quality.

Progress to Project Completion - May 1, 2001

All trials were completed as planned. All yield and processing quality evaluations have been completed. The Saskatchewan data has been sent to the PRPP administrators in Lethbridge for inclusion in the prairie-wide evaluation of the new cultivars. The data for the 1998 and 1999 growing seasons has been considered and used in determining which cultivars to release, which to drop and which to further evaluate.

Notable Program Achievements

In 2000, over 30% of the potatoes grown on the Canadian Prairies were cultivars developed by the PRPP. The release and introduction of new cultivars by the Prairie Regional Potato Program has resulted in increased acreage and enhanced competitiveness while also opening potential export markets. Some notable releases from this program over the last five years are;

Niska - is a chip cultivar with excellent processing characteristics and long term storage capability. Niska has consistently rated as one of the top varieties in the cross Canada chipping trials. Exclusive European rights to Niska have been sold to a German company.

AC Ptarmigan - is an early maturing cultivar licenced in 1993 and suited for both chipping and table use. A member of the Saskatchewan Seed Potato Growers Assoc. has the exclusive licence for Ptarmigan, with the royalties being ploughed back into the Prairie Regional Potato Program.

Amisk - a clonal variant of Ranger Russet, licenced in 1993, has joined Russet Burbank as the dominant french fry variety in North America. Significant acreages of Ranger and Amisk seed are being grown in Saskatchewan for export into the United States. Growers are beginning to prefer Amisk over Ranger, as it tends to be more uniform with less problems with blackspot bruising.

AC Stampede Russet - released from the program in 1999, this early maturing russet variety has excellent early yield potential with acceptable processing characteristics. AC Stampede Russet also has potential for used as an early season russet for the fresh-pack market. Maple Leaf Foods of Alberta has been granted an exclusive licence for AC Stampede Russet.

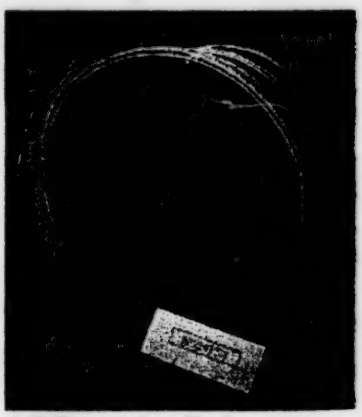
AC Glacier Chip - is a high yielding chipping cultivar with excellent processing characteristics. Exclusive commercialization rights for this line have been requested by Potato Growers of Alberta.

AC Maple Gold - is a high yielding yellow fleshed potato with potential in both the fresh market and french fry sectors. Exclusive commercialization rights for this line have been requested by Maple Leaf Foods.

FV9649-6

FV 9649-6 - A fresh market russet type. Produces a very uniform crop with very shallow eyes. Resistant to hollow heart, after cooking discoloration and sloughing. Registration trials indicate yields at maturity superior to Burbank and equivalent to Norkotah. The variety did poorly under drought stress in dryland trials in 1999. **SSPGA has the exclusive licencing agreement for this variety with AAFC. This agreement started in 1999.**

AC Peregrine Red tested as ND2937-3, this is a round/oval dark red skinned line with shallow eyes and uniform tubers. This line has superior red color, particularly after storage. The line also shows little after cooking discoloration. Yields under irrigation in registration trials and in subsequent grower trials were equivalent or superior to the standard cultivar Norland. This variety is slower maturing than Norland and does not perform well under late season drought stress. Scab reaction is equivalent to Norland. **SSPGA has the exclusive licencing agreement for this variety with AAFC and the breeders at NDSU.**



AC Peregrine Red

Releases presently under evaluation by the SSPGA

The Saskatchewan Seed Potato Growers Association (SSPGA) working in affiliation with the Department of Plant Sciences is conducting pre-licencing trials of the follcwing lines derived from the Prairie Potato Cultivar Program. These trials are designed to evaluate key performance factors such as response to plant spacing, time of planting and harvest. Results for the 1998, 1999 and 2000 trials are presented in Appendices 1-4. Information of this type will allow growers to better select cultivars with characteristics in demand in their markets.

VO299-4 a high yielding oblong red skinned line with low internal and external defects. Resistance to common scab equal to Norland.

VO391-4 an early maturing oval red variety. Early market only as the variety tends to oversize.

VO498-1 a midseason oval red skinned clone. Yields and defects similar to Norland. Resistant to scab and early blight.

AV77531-1 a high yielding oval chipping type with exceptional disease resistance.

FV 10459-8 a high yielding oblong early cultivar with excellent french fry quality. Low internal and external defects.

VO168-3 A high yielding oblong mid-season russet line. Yields are superior to Goldrush or Russet Burbank. Very few internal defects. Good disease resistance.

CV89023-2 a maincrop red variety with few internal defects. Yields comparable to Norland.

CV 89024-1 an early red line. Some internal and external defects but exceptionally high yields.

In 2000, the Saskatchewan Seed Potato Growers Association working in affiliation with the Department of Plant Sciences also conducted field scale evaluations of the following lines derived from the Prairie Potato Cultivar Program at Raffard's Potato Farm located in Bradwell Saskatchewan.

AC Peregrine Red a red-skinned potato cultivar derived from the Prairie Regional Potato Breeding Program which is presently under exclusive licence to the Saskatchewan Seed Potato Growers Association. In test trials this variety was equivalent to the standard Norland in yields but had superior color and cooking characteristics.

FV9649-6 an early russet-skinned table variety derived from the Prairie Regional Potato Breeding Program which is presently under exclusive licence to the Saskatchewan Seed Potato Growers Association

Cherry Red a new red-skinned variety of interest to the industry. This variety tends to be quite late and low yielding. However, its small average tuber size makes it ideal for the restaurant trade.

VO498-1 a midseason oval red skinned clone. Yields and defects similar to Norland. Resistant to scab and early blight.

The test varieties were compared to industry standards (Norland) in strip trials conducted by the grower using standard management practices.

Results

The plots were established along the edge of the growers field in an area of relatively low fertility and poor soil quality. Crop vigor and yields in the plot area were low relative to standard conditions. Although the grower was utilizing a recommended fungicidal spray program, the field was hit with Late Blight in early August. This disease caused substantial defoliation in the plot area, further reducing yields. Small subsections of each plot were harvested in late September for yield evaluations. The remainder of the plot was harvested by the grower in late September using standard equipment. Samples of each cultivar were recovered from the commercial harvester and evaluated for skinning, tuber color, damage and quality.

The standard cultivar Norland is renowned for its earliness and high yield potential but its skin color fades during storage. Poor skin color reduces market appeal. In the 2000 trial. the new AC Peregrine Red line was as high yielding as Norland and had higher tuber specific gravities which suggests greater storage potential. However, the skin color of the AC Peregrine was poor relative to the Norlands. Whether this reflects a site effect or some other variable could not be determined. In previous trials AC Peregrine had superior color to Norland. After 4 months storage, the skin color of AC Peregrine was superior (darker red) than that of Norland.

None of the remaining cultivars performed well in this trial. The poor color of cherry Red is interesting as this cultivar is renowned for its excellent color.

For the remainder of the 2000/2001 storage season, samples of these cultivars will be recovered at intervals from the growers storage and analysed for color, weight loss and sprouting characteristics.

Table 1. Yields and quality characteristics for several new lines of potatoes in trial conducted in a commercial growers field in 2000.

	Total yield (t/ha)	Table yield (t/ha)	Tuber weight (g)	Specific gravity	Color
Norland	33.1	28.9	110	1.072	2.9*
AC Peregrine Red	32.8	27.0	104	1.081	1.2
FV9649-3	26.2	20.4	124	1.072	NA
VO498-1	25.3	20.4	95	1.072	2.2
Cherry Red	25.0	21.9	120	1.081	1.0
LSD	6.6	6.6	20	0.003	0.9

*** Skin color rated from 1 = pink through to % = v. dark red.**

Technical Reports

1) 1998 Prairie Regional Potato Cultivar Testing Report
2) 1998 Vegetable Cultivar Evaluation Trial Results (University of Saskatchewan)
3) 1998 Annual Report by the Saskatchewan Irrigation Development Centre
4) 1998 Report to SSPGA on Field Performance of Licenced Lines - submitted November 1998
5) 1999 Prairie Regional Potato Cultivar Testing Report
6) 1999 Vegetable Cultivar Evaluation Trial Results (University of Saskatchewan)
7) 1999 Annual Report by the Saskatchewan Irrigation Development Centre - March 2000
8) 1999 Report to SSPGA on Field Performance of Licenced Lines - December 1999
9) 2000 Prairie Regional Potato Cultivar Testing Report - December 2000
10) 2000 Annual Report by the Canada-Saskatchewan Irrigation Development Centre - March 2001
11) 2000 Report to SSPGA on Field Performance of Licenced Lines - December 2000
12) 2001 Vegetable Cultivar Evaluation Program - Trial results - Feb, 2001

Project Related Extension Activities

1) Results were presented to growers at;
   a) Prairie Potato Council Annual Meetings 1999
   b) Saskatchewan Seed Potato Growers Annual Meeting 1999
   c) Saskatchewan Vegetable Growers Annual Meeting 2000
   d) Saskatchewan Seed Potato Growers Assoc Annual Meeting 2000

2) Description of AC Stampede Russet was published in the American Potato Journal in 2000.
   Description of AC Peregrine Red was published in the American Potato Journal in 2001
   Description of AC Maple Gold was published in the American Potato Journal in 2001.
   Description of AC Glacier Chip was published in the American Potato Journal in 2001

3) Field plots were toured as components of the 1999 and 2000 Horticulture Science Department and C.S.I.D.C. field days, Saskatchewan Seed Potato Growers Field Day, and various other events.

Appendix 1. **Yields and tuber size distribution of three russet type potato cultivars at 90 and 120 days after planting under irrigated and dryland conditions in 1999.**

EARLY HARVEST - 90 days

	Tablestock (t/ha)				Seed (t/ha)				Avg. Tuber Wt. (g)				Specific GravityAvg. Tuber Wt. (g)			
	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q
DRYLAND																
R. Burbank	26.2	24.5	25.4	NS/NS	38.7	32	32.1	NS/NS	113	134	134	L	1.081	1.088	1.085	NS/NS
R. Norkotah	33.2	34.9	37.8	L	39.5	39.8	39.7	NS/NS	144	167	201	L	1.09	1.086	1.083	L
FV 9649-6	28.5	24.7	30	NS/NS	40	30.9	33.7	NS/NS	117	135	161	L	1.076	1.072	1.07	NS/NS
LSD 0.05	6.3	5.8	6.1		5.4	6.3	6		21	55	27		0	0	0	
IRRIGATED																
R. Burbank	25.9	32.4	27.6	NS/NS	33.2	37.4	32.6	NS/NS	129	153	148	NS/NS	1.078	1.08	1.078	NS/NS
R. Norkotah	32.9	47	38.3	Q	38	49.9	40.4	Q	156	190	200	L	1.08	1.08	1.08	NS/NS
FV 9649-6	35.8	39.5	37.2	Q	43.2	45	40.6	NS/NS	137	152	173	L	1.074	1.074	1.074	NS/NS
LSD 0.05	3.8	4.7	4.7		6.5	6.1	5.5		36	36	27		0	0	0	

FINAL HARVEST - 120 DAYS

DRYLAND																
R. Burbank	25.5	27.8	26.7	NS/NS	40	35.2	33	L	110	135	143	L	1.093	1.092	1.094	NS/NS
R. Norkotah	33.2	45.7	37.5	Q	40	46.4	40.9	Q	141	190	190	L/Q	1.083	1.083	1.079	NS/NS
FV 9649-6	27.2	34.8	32.4	NS/NS	39.2	44.4	37.4	NS/NS	116	129	164	L	1.071	1.074	1.077	NS/NS
LSD 0.05	7	2.8	5.5		4.6	4.7	5.7		23	15	37		0	0	0	
IRRIGATED																
R. Burbank	33.4	31.8	33.2	NS/NS	41.4	36.4	37	NS/NS	134	170	165	L/Q	1.092	1.087	1.091	Q
R. Norkotah	37	40.7	37.5	NS/NS	40.9	43.6	40.2	NS/NS	164	183	206	L	1.078	1.076	1.075	NS/NS
FV 9649-6	24.2	32.8	31.1	NS/NS	36.2	39.5	34.3	NS/NS	113	142	162	L	1.071	1.071	1.071	NS/NS
LSD 0.05	5.5	7.2	4.6		5.1	7.9	6.1		12	13	30		0	0	0	

*Linear (L) or Quadratic (Q) relationship between variable and in-row spacing (P=0.05).

Appendix 2. **Yields and tuber size distribution of three red skinned potato cultivars at 90 and 120 days after planting under irrigated and dryland conditions in 1999.**

EARLY HARVEST - 90 days

	Tablestock (t/ha)				Seed (t/ha)				Avg. Tuber Wt. (g)				Specific Gravity			
	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q
DRYLAND																
Norland	43.5	35.6	36	L/Q	48.5	40	40.5	L/Q	137	135	138	NS/NS	1.068	1.072	1.068	NS/NS
Cherry Red	28.1	20.4	20.3	L	33	23.6	22.2	L	123	117	136	Q	1.085	1.078	1.073	L
VO 498-1	40.6	38.5	40.9	NS/NS	46.8	41.2	44	NS/NS	132	148	158	L	1.069	1.068	1.074	NS/NS
LSD 0.05	7.3	7.1	6.5		8.4	6.8	6		9	18	18		0	0	0.01	
IRRIGATED																
Norland	48.5	44.9	45.5	NS/NS	51.4	47.4	46.9	NS/NS	143	158	167	L	1.07	1.072	1.067	NS/NS
Cherry Red	28.7	22.5	22	L	31.9	24	22.3	L	159	161	174	L	1.081	1.076	1.078	NS/NS
VO 498-1	40.6	54.2	45	Q	45.4	58.4	46.3	Q	136	170	190	L	1.066	1.065	1.068	NS/NS
LSD 0.05	6.1	5.4	8		5.3	6	7.2		19	38	23		0	0	0	

FINAL HARVEST - 120 DAYS

DRYLAND																
Norland	44.4	43.2	34.7	NS/NS	51	47.8	37.9	L	126	134	139	L	1.068	1.067	1.069	NS/NS
Cherry Red	24.3	25	22.7	NS/NS	30.5	28.3	24.8	NS/NS	113	125	137	L	1.081	1.085	1.082	NS/NS
V0 498-1	41.1	49	40.8	NS/NS	48	53.5	44.7	NS/NS	132	161	174	L	1.071	1.072	1.072	NS/NS
LSD 0.05	8.3	8.9	7.1		7.6	7.4	6.6		19	18	25		0	0	0	
IRRIGATED																
Norland	42.1	41.8	35.6	NS/NS	46.5	44.1	38	L	137	148	152	L	1.068	1.068	1.066	NS/NS
Cherry Red	31.9	31.8	26.8	NS/NS	32.5	30.5	24.9	L	159	193	207	L	1.086	1.082	1.081	NS/NS
VO 498-1	48.9	52.7	42.8	L/Q	52.4	54.5	43.2	L/Q	156	170	191	L	1.068	1.069	1.067	NS/NS
LSD 0.05	6.4	7.3	6.1		6.1	8.9	6		16	34	16		0	0	0	

*Linear (L) or Quadratic (Q) relationship between variable and in-row spacing (P=0.05).

Appendix 3. **Yields and tuber size distribution of five russet type potato cultivars at 90 and 120 days after planting under irrigated and dryland conditions in 2000.**

EARLY HARVEST - 90 days

	Tablestock (t/ha)				Seed (t/ha)				Avg. Tuber Wt. (g)				Specific GravityAvg. Tuber Wt. (g)			
	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q
DRYLAND																
R. Burbank	15.2	15.3	12.9	NS/NS	23.4	19.8	16.7	*/NS	111	124	133	*/NS	1.074	1.076	1.085	NS/NS
R. Norkotah	23.6	24.9	23.4	NS/NS	27.9	27.2	25	NS/NS	168	188	186	NS/NS	1.076	1.081	1.079	NS/NS
FV 9649-6	20.6	21.9	22.9	NS/NS	27.2	27.1	25.7	NS/NS	114	119	132	**/NS	1.072	1.078	1.076	NS/NS
Gem Russet	9	4.8	5.8	NS/NS	22.3	15	14.9	**/*	83	94	89	NS/NS	1.098	1.098	1.094	NS/NS
Umatilla	20.4	18.9	17.1	NS/NS	28.2	24.2	20.9	*/NS	110	118	142	*/NS	1.082	1.081	1.078	NS/NS
LSD 0.05	4.3	4.9	4.6		5.7	4.8	4.3		21	22	27		0	0	0	
IRRIGATED																
R. Burbank	23	18	14.3	*/NS	31.3	23.7	18.6	*/NS	110	124	124	*/NS	1.076	1.078	1.081	NS/NS
R. Norkotah	34.3	30.4	23.9	**/NS	36.1	33.6	26.4	**/NS	166	172	185	*/NS	1.08	1.08	1.078	NS/NS
FV 9649-6	35.3	32.9	21.5	*/NS	40.9	38.2	25.2	**/NS	142	145	148	NS/NS	1.07	1.072	1.075	NS/NS
Gem Russet	21.6	19.3	15.4	*/NS	30.3	25.2	20.2	**/NS	114	120	124	NS/NS	1.091	1.088	1.09	NS/NS
Umatilla	27	23.4	22.2	NS/NS	35.8	29.8	25.5	*/NS	117	130	164	**/NS	1.08	1.074	1.076	NS/NS
LSD 0.05	7.1	6.2	6.1		8.1	6.5	6		18	19	24		0	0	0	

FINAL HARVEST - 120 DAYS

DRYLAND																
R. Burbank	26.2	23.2	20	NS/NS	31.1	27.8	23.2	*/NS	147	158	162	NS/NS	1.098	1.1	1.099	NS/NS
R. Norkotah	34.2	30.9	30.4	NS/NS	36.7	32.6	29.2	*/NS	180	213	239	*/NS	1.093	1.094	1.093	NS/NS
FV 9649-6	23.9	28.8	26.2	NS/NS	28.8	33.5	27.8	NS/*	129	140	164	**/NS	1.085	1.09	1.088	NS/NS
Gem Russet	23.3	20.6	16.2	NS/NS	31	27.8	23.2	*/NS	117	122	117	NS/NS	1.113	1.115	1.114	NS/NS
Umatilla	25.9	26.9	24.5	NS/NS	32.2	30.4	26.6	NS/NS	137	155	183	*/NS	1.104	1.105	1.105	NS/NS
LSD 0.05	7.2	6	6.9		8.4	5.6	5.8		12	33	30		0	0	0	
IRRIGATED																
R. Burbank	35.7	37.4	33.2	NS/NS	39.6	39.6	36	NS/NS	174	176	179	NS/NS	1.099	1.098	1.095	NS/NS
R. Norkotah	49.6	42.1	43.6	NS/NS	49.8	42.4	41.2	*/NS	189	190	223	*/NS	1.086	1.085	1.086	NS/NS
FV 9649-6	41.2	34.2	33.5	NS/NS	44.8	38.6	32.4	*/NS	144	153	169	*/NS	1.077	1.078	1.077	NS/NS
Gem Russet	41.8	42	34.6	NS/NS	47.3	45.2	36.8	*/NS	153	169	191	*/NS	1.104	1.103	1.101	NS/NS
Umatilla	43.2	45.4	40.7	NS/NS	49.2	49.1	40.7	*/NS	155	172	189	*/NS	1.096	1.097	1.093	NS/NS
LSD 0.05	6.9	7.1	11.9		7.5	7.5	11.5		27	32	34		0	0	0	

*Linear (L) or Quadratic (Q) relationship between variable and in-row spacing (P=0.05).

Appendix 4. **Yields and tuber size distribution of four red skinned potato cultivars at 90 and 120 days after planting under irrigated and dryland conditions in 2000.**

EARLY HARVEST - 90 days

	Tablestock (t/ha)				Seed (t/ha)				Avg. Tuber Wt. (g)				Specific Gravity			
DRYLAND	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q	15 cm	23 cm	35 cm	L/Q
Norland	33.3	28.9	26.9	*/NS	36	29.6	27.8	*/NS	137	156	167	*/NS	1.071	1.071	1.074	NS/NS
Cherry Red	26.1	24.3	18.5	*/NS	28.3	25.2	19.8	**/NS	135	164	156	**/**	1.085	1.083	1.083	NS/NS
VO 498-1	23.1	22.5	16.7	*/NS	25.6	24.6	18.5	*/NS	151	139	169	NS/NS	1.072	1.073	1.064	*/NS
AC Peregrine Red	20.5	20.2	15.7	NS/NS	27.8	24.6	21.3	*/NS	88	102	97	NS/NS	1.078	1.077	1.074	NS/NS
LSD 0.05	7.2	9.4	6.3		6.6	9.7	6.2		50	26	39		0.01	0.01	0.02	
IRRIGATED																
Norland	47.8	41.8	34.9	**/NS	50.1	43.5	35.1	**/NS	167	161	182	NS/NS	1.074	1.072	1.068	NS/NS
Cherry Red	38.5	30	26	**/NS	41.4	30.8	26	**/NS	144	175	168	*/NS	1.079	1.079	1.077	NS/NS
VO 498-1	42.6	35.2	32.1	**/NS	44	36.5	33.4	**/NS	150	160	156	NS/NS	1.069	1.068	1.068	NS/NS
AC Peregrine Red	30.1	26.2	24.2	*/NS	37.3	33.5	29.2	*/NS	104	97	105	NS/NS	1.07	1.072	1.073	NS/NS
LSD 0.05	4.9	5.2	6.2		4.6	5.3	6.3		28	17	16		0	0	0	

FINAL HARVEST - 120 DAYS

DRYLAND																
Norland	40.3	35.6	29.3	*/NS	40.8	34.2	28.7	*/NS	151	170	155	NS/*	1.081	1.083	1.082	NS/NS
Cherry Red	34.2	32.5	23.6	*/NS	36	31.8	23	**/NS	156	170	170	NS/NS	1.101	1.101	1.098	NS/NS
V0 498-1	28.4	30.3	24.3	NS/NS	30.3	30.6	24.3	*/NS	138	154	156	*/NS	1.08	1.083	1.083	NS/NS
AC Peregrine Red	27.3	20.4	21.4	NS/NS	32.9	25.2	25.6	NS/NS	109	98	104	NS/NS	1.096	1.095	1.097	NS/NS
LSD 0.05	11.7	6.4	4.5		10.8	6.2	4.2		25	17	24		0	0	0	
IRRIGATED																
Norland	53	44.9	41.3	*/NS	51.5	43.3	38.6	*/NS	160	172	188	**/NS	1.078	1.076	1.078	NS/NS
Cherry Red	46	40.3	36.1	*/NS	45.3	38.5	29.5	**/NS	160	187	223	**/NS	1.09	1.089	1.091	NS/NS
VO 498-1	42	34.9	32.8	**/NS	41.9	35	32.5	**/NS	145	162	174	NS/NS	1.074	1.074	1.074	NS/NS
AC Peregrine Red	40.4	42	36.2	NS/NS	44.6	41.2	38.2	NS/NS	120	128	127	NS/NS	1.081	1.081	1.083	NS/NS
LSD 0.05	5.5	5.1	8.6		5.9	4.3	9.4		20	17	37		0	0	0	